1 <u>CLAIMS</u>

2 What is claimed is:

3 1. An exclusion controller which allows an information processing

4 unit to acquire a contended resource to the exclusion of other

5 information processing units, the exclusion controller comprising:

6   a plurality of non-prioritized information processing units

7 mutually exclusively acquiring a non-prioritized exclusion right by

8 a first process, the non-prioritized exclusion right indicating a

9 candidate for acquiring the contended resource; and

10   a prioritized information processing unit acquiring the

11 contended resource by a second process to the exclusion of the

12 non-prioritized information processing unit having acquired the

13 non-prioritized exclusion right, the second process requiring a

14 shorter processing time than the first process.

15 2. The exclusion controller according to claim 1, further

16 comprising:

17   a prioritized exclusion right storage area for storing

18 prioritized exclusion right information indicating that the

19 prioritized information processing unit is trying to acquire the

20 contended resource; and

1   a non-prioritized exclusion right storage area for storing

2   non-prioritized exclusion right information indicating which of the

3   plurality of non-prioritized information processing units has

4   acquired the non-prioritized exclusion right,

5   wherein each non-prioritized information processing unit

6   executes, as the first process, a process for storing the

7   non-prioritized exclusion right information indicating that the

8   non-prioritized information processing unit has acquired the

9   non-prioritized exclusion right, to the exclusion of the other

10   non-prioritized information processing units if the non-prioritized

11   exclusion right information has not yet stored, and

12   the prioritized information processing unit executes, as the

13   second process, a process for storing the prioritized exclusion

14   right information and then reading the non-prioritized exclusion

15   right storage area, and acquires the contended resource if the

16   non-prioritized exclusion right information is not stored, but does

17   not acquire the contended resource if the non-prioritized exclusion

18   right information has already stored.

19   3. The exclusion controller according to claim 2, further

20   comprising:

21   an area usage type storage area for storing information

1   indicating which of the non-prioritized exclusion right information

2   or prioritized information processing unit information the

3   non-prioritized exclusion right storage area stores,

4   wherein the non-prioritized exclusion right storage area

5   stores any one of the non-prioritized exclusion right information

6   and the prioritized information processing unit information

7   indicating which of the plurality of information processing units is

8   the prioritized information processing unit, and

9   each of the prioritized information processing unit and the

10   plurality of non-prioritized information processing units acquires

11   the non-prioritized exclusion right by the first process if the

12   non-prioritized exclusion right storage area stores the

13   non-prioritized exclusion right information, and the information

14   processing unit acquires the contended resource if the information

15   processing unit has acquired the non-prioritized exclusion right.

16   4. The exclusion controller according to claim 2, further comprising

17   a prioritized information processing unit change unit for changing

18   the prioritized information processing unit into a non-prioritized

19   information processing unit if non-prioritized exclusion right

20   information has been already stored, in the second process.

1   5. The exclusion controller according to claim 2, further

2   comprising:

3   an acquisition check unit for checking whether the acquisition

4   of the contended resource by any one of the first and second

5   processes has failed; and

6   a monitor control unit for executing exclusion control by a

7   monitor mode in which all the information processing units waiting

8   to acquire the contended resource are previously recorded and the

9   information processing unit having released the contended resource

10   notifies the information processing units waiting to acquire the

11   contended resource that the contended resource has been released, if

12   a check has been made that the acquisition of the contended resource

13   has failed.

14   6. The exclusion controller according to claim 1, further

15   comprising:

16   a prioritized information processing unit information storage

17   area for storing prioritized information processing unit information

18   indicating which of the information processing units is the

19   prioritized information processing unit; and

20   a prioritized information processing unit setting unit for

21   allowing any one of the plurality of information processing units to

1   execute a process for storing, in the prioritized information

2   processing unit information storage area, the prioritized

3   information processing unit information indicating that the

4   information processing unit is the prioritized information

5   processing unit, to the exclusion of the other information

6   processing units if the prioritized information processing unit

7   information has not been stored.

8   7. The exclusion controller according to claim 1, further comprising

9   a prioritized information processing unit setting unit for setting

10 the information processing unit having first acquired the contended

11 resource as the prioritized information processing unit and for

12 setting the other information processing units except the

13 prioritized information processing unit as the non-prioritized

14 information processing units.

15 8. The exclusion controller according to claim 1, further comprising

16 a prioritized information processing unit change unit for changing

17 any one of the non-prioritized information processing units into the

18 prioritized information processing unit.

19 9. The exclusion controller according to claim 8, further

1   comprising:

2   a full stop unit for stopping all of the plurality of

3   information processing units,

4   wherein the prioritized information processing unit change

5   unit changes the non-prioritized information processing unit having

6   acquired the contended resource at the time when all of the

7   plurality of information processing units are stopped, into the

8   prioritized information processing unit.

9   10. The exclusion controller according to claim 1, further

10   comprising:

11   a resource information storage area for storing resource

12   information indicating whether the contended resource has been

13   acquired by any one of the plurality of information processing

14   units, while associating the resource information with priority

15   right information indicating that the prioritized information

16   processing unit exists,

17   wherein the prioritized information processing unit executes,

18   as the second process, a process for reading information from the

19   resource information storage area and for writing the resource

20   information in the resource information storage area if the priority

21   right information is stored, and

1   wherein each non-prioritized information processing unit

2 comprises:

3   a prioritized information processing unit stop unit for

4 stopping the prioritized information processing unit;

5   a priority right removal unit for removing the priority right

6 information from the resource information storage area by the first

7 process exclusively from the other information processing units

8 after the prioritized information processing unit stop unit has

9 stopped the prioritized information processing unit;

10   a transient state check unit for checking whether the stopped

11 prioritized information processing unit is executing the second

12 process; and

13   an execution state setting unit for setting an execution state

14 of the prioritized information processing unit to a state in which

15 the prioritized information processing unit is not acquiring the

16 contended resource by the second process, if a check has been made

17 that the prioritized information processing unit is executing the

18 second process.

19 11. The exclusion controller according to claim 10, wherein the

20 execution state setting unit sets the execution state by setting

21 execution location information indicating an execution location of a

1   program realizing the prioritized information processing unit to be

2   in a state before the resource information storage area is read.

3   12. The exclusion controller according to claim 10, wherein the

4   execution state setting unit invalidates a process for writing in

5   the resource information storage area in the second process.

6   13. The exclusion controller according to claim 10, further

7   comprising a monitor control unit for executing exclusion control by

8   a monitor mode in which all the information processing units waiting

9   to acquire the contended resource are previously recorded and the

10   information processing unit having released the contended resource

11   notifies the information processing units waiting to acquire the

12   contended resource that the contended resource has been released, if

13   information indicating that the prioritized information processing

14   unit does not exist has been stored in the resource information

15   storage area.

16   14. An exclusion controller which allows any one of a plurality of

17   threads capable of acquiring an identical contended resource to

18   acquire the contended resource to the exclusion of the other threads

19   different from the relevant thread, the exclusion controller

1   comprising:

2   an execution state acquisition/notification unit for acquiring

3   execution location information indicating an execution location of a

4   program in a first thread of the threads and for notifying a second

5   thread different from the first thread of the execution location

6   information; and

7   an execution state setting unit for allowing the second thread

8   to execute a process for setting, in the first thread, execution

9   location information indicating that the contended resource is not

10   being acquired, if the acquired execution location information

11   indicates that the contended resource is being acquired.

12   15. An exclusion control method for allowing an information

13   processing unit to acquire a contended resource to the exclusion of

14   other information processing units, the exclusion control method

15   comprising:

16   a plurality of non-prioritized information processing modules

17   for mutually exclusively acquiring a non-prioritized exclusion right

18   by a first process, the non-prioritized exclusion right indicating a

19   candidate for acquiring the contended resource; and

20   a prioritized information processing module for acquiring the

21   contended resource by a second process to the exclusion of the

1 non-prioritized information processing unit having acquired the

2 non-prioritized exclusion right, the second process requiring a

3 shorter processing time than the first process.

4 16. An exclusion control method for allowing any one of a plurality

5 of threads capable of acquiring an identical contended resource to

6 acquire the contended resource to the exclusion of the other threads

7 different from the relevant thread, the exclusion control method

8 comprising:

9   an execution state acquisition/notification module for

10 acquiring execution location information indicating an execution

11 location of a program in a first thread of the threads and for

12 notifying a second thread different from the first thread of the

13 execution location information; and

14   an execution state setting module for allowing the second

15 thread to execute a process for setting, in the first thread,

16 execution location information indicating that the contended

17 resource is not acquired, if the acquired execution location

18 information indicates that the contended resource is acquired.

19 17. A program for causing a computer to function as an exclusion

20 controller which allows an information processing unit to acquire a

1 contended resource to the exclusion of other information processing

2 units, the program causing the computer to effect the functions of

3 claim 1.

4 18. A program for causing a computer to function as an exclusion

5 controller which allows any one of a plurality of threads capable of

6 acquiring an identical contended resource to acquire the contended

7 resource to the exclusion of the other threads different from the

8 relevant thread, the program causing the computer to effect the

9 functions of claim 14.

10 19. A recording medium having a program recorded thereon, the

11 program causing a computer to function as an exclusion controller

12 which allows an information processing unit to acquire a contended

13 resource to the exclusion of other information processing units,

14 wherein the program causes the computer to function as:

15 a plurality of non-prioritized information processing units

16 mutually exclusively acquiring a non-prioritized exclusion right by

17 a first process, the non-prioritized exclusion right indicating a

18 candidate for acquiring the contended resource; and

19 a prioritized information processing unit acquiring the

20 contended resource by a second process to the exclusion of the

1   non-prioritized information processing unit having acquired the

2   non-prioritized exclusion right, the second process requiring a

3   shorter processing time than the first process.

4   20. A recording medium having a program recorded thereon, the

5   program causing a computer to function as an exclusion controller

6   which allows any one of a plurality of threads capable of acquiring

7   an identical contended resource to acquire the contended resource to

8   the exclusion of the other threads different from the relevant

9   thread, wherein the program causes the computer to function as:

10   an execution state acquisition/notification unit for acquiring

11 execution location information indicating an execution location of a

12 program in a first thread of the threads and for notifying a second

13 thread different from the first thread of the execution location

14 information; and

15   an execution state setting unit for allowing the second thread

16 to execute a process for setting, in the first thread, execution

17 location information indicating that the contended resource is not

18 being acquired, if the acquired execution location information

19 indicates that the contended resource is being acquired.

20 21. A computer program product comprising a computer usable medium

1   having computer readable program code means embodied therein for

2   causing exclusion control, the computer readable program code means

3   in said computer program product comprising computer readable

4   program code means for causing a computer to effect the functions of

5   claim 1.

6   22. A computer program product comprising a computer usable medium

7   having computer readable program code means embodied therein for

8   causing exclusion control, the computer readable program code means

9   in said computer program product comprising computer readable

10   program code means for causing a computer to effect the functions of

11   claim 14.

12   23. An article of manufacture comprising a computer usable medium

13   having computer readable program code means embodied therein for

14   causing exclusion control, the computer readable program code means

15   in said article of manufacture comprising computer readable program

16   code means for causing a computer to effect the steps of claim 15.

17   24. A program storage device readable by machine, tangibly embodying

18   a program of instructions executable by the machine to perform

19   method steps for exclusion control, said method steps comprising the

1   steps of claim 15.

2   25. An article of manufacture comprising a computer usable medium

3   having computer readable program code means embodied therein for

4   causing exclusion control, the computer readable program code means

5   in said article of manufacture comprising computer readable program

6   code means for causing a computer to effect the steps of claim 16.

7   26. A program storage device readable by machine, tangibly embodying

8   a program of instructions executable by the machine to perform

9   method steps for exclusion control, said method steps comprising the

10   steps of claim 16.